

WE CLAIM

1. A steel for machine structural use having excellent chip-breakability, comprising alloying elements necessary for a machine structural steel except for Pb and Bi, at least five MnS-inclusion particles having averaged particle size of  $1.0 \mu\text{m}$  or more existing per  $\text{mm}^2$  per S-content 0.01%, in the microscopic field, the condition ( $\text{area}[\mu\text{m}^2]/\text{aspect ratio}\right) \geq 10$  being met, the area percentage of Ca-containing sulfide inclusion particles containing at least 1.0wt.% of Ca being in the range of 15-40% of the area of all the sulfide inclusion particles, and film of sulfide inclusions being formed on the tool surface during turning thereby to minimize curl diameter of chips.

2. The steel for machine structural use having excellent chip-breakability according to claim 1, wherein the steel consists essentially of, by wt.%, C: 0.05-0.8%, Si: 0.01-2.5%, Mn: 0.1-3.5%, S: 0.01-0.2%, Ca alone or both Ca and Mg (in case of the both, the total amount): 0.0005-0.02%, one or both of Ti: 0.002-0.010% and Zr: 0.002-0.025%, O: 0.0005-0.010%, and the balance of inevitable impurities and Fe.

3. The steel for machine structural use having excellent chip-breakability according to claim 2, wherein the steel further contains, in addition to the alloy components defined in claim 2, one or more of Se: up to 0.4%, Te: up to 0.2% and REM: up to 0.05%.

4. The steel for machine structural use having excellent chip-breakability according to one of claims 2 and 3, wherein the steel further contains, in addition to the alloy components defined in claim 2 and 3, one or more of Cr: up to 3.5%, Mo: up to 2.0%, Cu: up to 2.0%, Ni: up to 4.0% and B: 0.0005-0.01%.

5. The steel for machine structural use having excellent chip-breakability according to one of claims 2 to 4, wherein the steel further contains, in addition to the alloy components defined in claim 2 to 4, one or both of Nb: up to 0.2% and V: up to 0.5%.